Preliminary Assessment Sampling and Analysis Plan

Crawford Street Site Portland, Oregon

Prepared for

Crawford Street Corporation

January 26, 2001

BRIDGEWATER GROUP, INC.

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SECTION 1

INTRODUCTION

This Preliminary Assessment (PA) Sampling and Analysis Plan (SAP) describes the sampling and analysis that will be performed as part of the PA performed for the Crawford Street Corporation (CSC) site in Portland, Oregon (Figure 1-1 and Figure 1-2).

This SAP is revised from the SAP presented in the June 14, 2000, *Preliminary Assessment, Crawford Street Site, Portland, Oregon* report. The revisions are based on the SAP proposed in the June 14, 2000 PA report, DEQ's July 24, 2000 comments on the proposed sampling program, and recent property ownership determinations.

SECTION 2

SAMPLING AND ANALYSIS OF SOURCE/PATHWAYS OF CONCERN

This section presents the sampling and analysis program that will be performed at the CSC site as part of the PA. The purpose of the sampling and analysis is to assess whether releases of Contaminants of Interest (COIs) have occurred from potential source(s) and whether released COIs have migrated through the identified potential pathways to the Willamette River or otherwise could pose a potential threat to human health and the environment.

Potential source(s) that require further assessment and their associated COIs are discussed in Section 5 of the June 14, 2000 PA report. These features of concern and associated COIs are:

Storm Water Runoff From Columbia Forge Yard – PAHs, VOCs, and metals

Import Black Sand in southwest portion of South Area – PAHs, lead, mercury

The sampling and analysis program was developed to assess whether releases have occurred from these possible sources and whether these releases may pose a potential threat to human health and the environment.

In addition to these potential source(s), DEQ has requested that samples be collected from where offsite runoff flows across the Site, from down gradient (south) of what they consider potential historical source areas, and from beneath abandoned pipes that daylight from the riverbank.

2.1 Storm Water Runoff From Columbia Forge Yard

The sampling and analysis program for the Columbia Forge operation yard storm water runoff was developed based on the specific routes through which a possible release from the yard could pose a threat to human health or the environment. The basis for the potential exposure pathways are discussed in Section 4 of the June 14, 2000 PA report.

2.1.1 Worker Contact with Surface Soil

A surface soil sample will be collected from the unpaved portion of the Columbia Forge yard (i.e. the low area near the southwest corner) to assess whether there has been a release to the surface soil that could pose a threat to workers through direct contact (ingestion or dermal

exposure routes) or through inhalation. This area is where soil staining was observed during the site reconnaissance and is also the topographical low point where surface water runoff from other areas of the Columbia Forge operations yard accumulates.

A surface soil sample will be collected from the upper 6-inches of soil in this area and analyzed for the Columbia Forge COIs (PAHs, metals, and VOCs). The specific laboratory analyses that will be performed are presented in Section 5.1 below.

Figure 2-1 shows the push probe soil sample location (SS-1). Other possible areas where direct contact with surface soil with possible COIs due to the Columbia Forge yard runoff (i.e. at former drain outlets along UPRR spur) will be sampled as described in Section 2.1.2.

2.1.2 Migration Through Surface Water Drainage to Willamette River Receptors

The potential for COIs to have been released from the Columbia Forge yard and to have migrated to the Willamette River via the surface water pathway will be assessed by collecting two surface soil samples. The soil samples will be collected from where storm water runoff from the Columbia Forge operations yard previously drained from collection pipes to the ground surface near the UPRR rail spur. As noted in the June 14, 2000 PA report, equipment operations in the Columbia Forge operations yard may have resulted in incidental drips of oils and associated oily runoff. The proposed sampling locations SS-2 and SS-3 are located where possible oily water runoff from the Columbia Forge operations yard could possibly have been released to the surface soil and migrated with local surface water. Figure 2-1 shows the proposed soil sampling locations.

Because sample SS-3 is on City of Portland property, collecting sample SS-3 will require obtaining access from the City of Portland.

In addition, DEQ has requested that a surface soil sample (SS-4) be collected at the southern edge of the Site where North John Street intersects the UPRR tracks. Runoff from offsite properties crosses the Site at this sample location.

Surface soil contamination is expected to be the most indicative of a possible release to the soil from surface water runoff. Therefore, the soil samples will be collected from the upper 6-inches of the ground surface at the proposed locations shown in Figure 2-1. The soil samples will be analyzed for the Columbia Forge COIs (PAHs, metals, and VOCs). The specific laboratory analyses that will be performed are presented in Section 5.1.

2.1.3 Migration Through Groundwater to Willamette River Receptors

As described in Section 4.1.2 of the June 14, 2000 PA report, the sole possible exposure pathway associated with impacted groundwater at the CSC site is through discharge of the shallow groundwater to the Willamette River bordering the southern edge of the CSC site. Any

groundwater impacts resulting from possible releases in the Columbia Forge yard would pose a threat only by migrating and discharging to the river.

The groundwater sampling and analysis program described in Section 2.3 will assess this possible migration and exposure pathway.

2.2 Import Black Sand

2.2.1 Worker Direct Contact with Soil

One soil sample will be collected from where the black sand is exposed at the ground surface along the top of the bank in the South Area of the CSC site. This soil sample will be collected to assess whether the black sand represents a release to the soil that could pose a threat to workers through direct contact (ingestion or dermal exposure routes) or through inhalation.

The soil sample will be collected using push probe sampling methods. In particular, the black sand near-surface soil sample will be collected from the push probe exploration performed to assess the DEQ-identified potential historical sources (Section 2.3). Push probe exploration PP-1 location is also where the black sand is present in the near-surface soil. The initial push probe sample (0 to 4 feet depth) will be used to assess possible worker direct contact with the black sand.

A soil sample will be collected for laboratory analysis from the most visibly stained soil horizon exposed in the push probe soil sample. Figure 2-1 shows the approximate location of the proposed push probe soil sample (PP-1).

The sample will be analyzed for PAHs, lead, mercury, cadmium, chromium, and PCBs. The specific laboratory analyses that will be performed are presented in Section 5.2 below.

2.2.2 Leaching to Willamette River Receptors

One surface soil sample will be collected from where the black sand is exposed on the shoreline in direct contact with the Willamette River. This surface soil sample will be collected to assess whether the black sand represents a release to the surface soil that could pose a threat through leaching to the river.

The surface soil sample will be collected from the most heavily stained area exposed at the shoreline. Figure 2-1 shows the approximate location of the proposed surface soil sample (SS-5). The sample will be analyzed for PAHs, lead, mercury, cadmium, chromium, and PCBs. The specific laboratory analyses that will be performed are presented in Section 5.2.

2.2.3 Migration Through Groundwater to Willamette River Receptors

As described in Section 4.1.2 of the June 14, 2000 PA report, the sole possible exposure pathway associated with impacted groundwater at the CSC site is through discharge of the shallow groundwater to the Willamette River bordering the southern edge of the CSC site. Any groundwater impacts resulting from possible releases from the black sand would pose a threat only by migrating and discharging to the river.

The groundwater sampling and analysis program described in Section 2.3 will assess this possible migration and exposure pathway.

2.3 DEQ-Identified Potential Historical Sources

DEQ has identified the following historical features as requiring investigation to determine their potential as possible sources:

- 1969 sawmill and planing mill and 1911 and 1924 planing mill (along river front at west end of South Area).
- 1905 sawmill and 1924 Woolen Mills warehouse (along the riverfront south of the existing 200 ft by 200 ft Lampros Steel building).
- 1924 foundry, machine shop, pattern shop, and coke storage (along riverfront at east end of South area).

Figure 3-1 in the June 14, 2000 PA report shows the location of these historical features.

Soil and groundwater samples will be collected at the downgradient edge of the location of each of these features to assess for potential historical releases of hazardous substances and associated migration through the groundwater. The location of the sampling points is shown on Figure 2-1 (PP-1, PP-2, and PP-3). As noted in Section 2.2.1, PP-1 may also be used to collect a black sand near-surface soil sample.

The soil and groundwater samples will be collected using push probe sampling methods. The push probe explorations will be advanced to about 10 feet below the first encountered water in the exploration. Based on previous explorations at the Site, the push probe explorations are anticipated to be about 40 feet deep.

2.3.1 Soil Samples

Continuous soil samples will be collected the entire depth of the push probe exploration. All soil samples will be observed in the field for evidence of contamination (odor, sheen, discoloration, PID headspace measurements).

The soil sample with the greatest field evidence of contamination from each exploration will be analyzed for PAHs and VOCs. If the soil sample from PP-1 selected for laboratory analysis (based on the field observations) is from the upper 4 feet, the analysis performed on this

sample for the black sand assessment (Section 2.2.1) will be considered applicable to the assessment of the DEQ-identified potential historical sources. That is, only VOC analyses would be necessary in addition to the analysis performed for the black sand analyses.

One soil sample from the exploration south of the 1924 foundry/ machine shop/pattern shop/coke storage area (i.e. PP-3) will also be analyzed for metals. The specific laboratory analyses that will be performed on the push probe soil samples are presented in Section 5.3.1.

2.3.2 Groundwater Samples

A groundwater sample will be collected from each push probe exploration and analyzed for VOCs and PAHs. A groundwater sample will also be collected from the exploration south of the 1924 foundry/ machine shop/pattern shop/coke storage area (i.e. PP-3) and analyzed for metals. Both filtered and unfiltered samples will be analyzed. The specific laboratory analyses that will be performed on the push probe groundwater samples are presented in Section 5.3.2.

There is some question whether a sufficiently non-turbid groundwater sample can be collected from a push probe exploration given the lack of a properly installed well screen and developed filter pack possible only with an installed well. Because of the affinity that PAHs and metals have for soil particles, it is critical to ensure that the sample collected in representative of actual groundwater condition. Analysis of a turbid sample would measure the COIs on the suspended soil particles (which are not typically entrained in undisturbed groundwater) rather than the dissolved constituents in the groundwater. Particularly for metals, which are naturally occurring, the measured concentration in the unfiltered sample will not be representative of the metal concentrations in the groundwater. These issues will be considered in the interpretation of the sampling and analysis results.

It is also questionable whether the fine-grain deposits present near the water table surface will yield sufficient quantities of groundwater to allow reasonable collection of the sample volumes necessary for PAH and metal analysis. If initial push probe results indicate that sufficient groundwater sample volume cannot be reasonably obtained, DEQ will be contacted and the sampling program will be revised.

2.4 Abandoned Pipes

DEQ has requested that soil samples be collected from beneath the two abandoned pipes that daylight from the riverbank near the west and east ends of the Site. Soil samples will be collected from the upper 6-inches of soil directly beneath the ends of the pipes. The approximate locations of the samples are shown on Figure 2-1 (SS-6 and SS-7). The actual locations will be determined in the field based on the actual locations of the pipes.

The soil samples will be analyzed for PAHs, VOCs, and metals. The specific laboratory analyses that will be performed are presented in Section 5.4.

SECTION 3

DATA QUALITY OBJECTIVES

The data collected during the sampling and analysis program will be used to assess whether any releases have occurred from the suspect sources and whether these releases, if any, pose a potential threat to human health or the environment. This assessment will be performed by comparing the results of the sampling and analysis to conservative screening levels. In particular, the measured concentrations of hazardous substances in the soil samples, if any, will be compared to the following:

- EPA Region IX Preliminary Remediation Goals for industrial sites
- DEQ Risk Based Concentration values for direct worker contact, inhalation, and protection of groundwater pathways.
- DEQ Soil Cleanup Table concentrations
- EPA Soil Screening Concentrations for protection of groundwater

The measured concentrations of hazardous substances in the groundwater, if any, will be compared to ambient water quality criteria given the anticipated beneficial shallow groundwater use as discharge to the Willamette River.

The quality of the field and laboratory data will be sufficient to meet this end use of the data. In particular, the analytical laboratory detection limits will be lower than the screening criteria where possible with typical analytical techniques. The field sampling procedures will be performed to provide representative samples.

SECTION 4

SAMPLING PROCEDURES

This section presents the procedures that will be used to collect the samples described in Section 2.

4.1 Surface Soil Samples

Each surface soil sample collected for non-VOC analysis will consist of five subsamples composited into a single sample. The subsamples will be collected in a 5-point dice pattern across an approximately 5-foot by 5-foot area at each sample location.

The purpose of the composite sampling at each location is to obtain a concentration that is representative of how the soil in the area of the sample would impact a possible receptor or migration pathway (e.g. direct contact to a worker or impact on a surface water pathway). A single point concentration is not representative of how the soil contamination in the sample area would affect a possible receptor. Given the small subarea from which each subsample is collected (about 5 square feet), single point concentrations at each subsample location are not representative or useful.

Surface soil samples collected from beneath the abandoned pipe ends will be collected from a single point directly beneath the end of the pipe. The compositing method described above will not be used for the abandoned pipe surface soil samples.

Each sample will be collected using the following procedure:

- Scrape away surface vegetation, if present, at each subsample location.
- Excavate a minimum 6-inch deep hole with a clean shovel at each subsample location. If necessary, a clean pick will be used to penetrate the surface.
- After the hole is excavated, collect the soil sample across the upper 6-inches of the sidewall of the hole with a clean trowel or spoon. Exclude large gravel or organic debris from the sample.
- Place the subsample in the laboratory-supplied glass container. Fill the container about 1/5 with each subsample. Instruct the analytical laboratory to thoroughly mix the sample before collecting the aliquot for analysis.
- Place the filled sample container in a chilled cooler for transport to the analytical laboratory.

Samples collected for VOC analyses will consist of a point sample collected from any stained areas within the composite area. If stained soil is not present in the composite area, the VOC sample will be collected from the center point of the 5-point dice pattern.

The samples will be collected and transported using proper chain-of-custody procedures. The samples will be transported to the analytical laboratory within 24 hours of collection. Field notes will be maintained noting the general soil conditions and any unusual or unanticipated conditions.

4.2 Push Probe Soil and Groundwater Sampling

Soil and groundwater samples will be collected using push probe sampling equipment. The methods and procedures that will be used to collect the soil and groundwater samples using the push probe equipment are described below.

4.2.1 Soil Sampling

Continuous soil samples will be collected by pushing a 4-foot long, nominal 2-inch diameter core barrel using a truck-mounted push probe rig. The core barrel will be fitted with a polyvinyl chloride (PVC) sleeve. Soil samples will be collected from the sampler by cutting open the PVC sleeve and placing soil in a 9-ounce sample jar that is capped with Teflon lined lid.

The sampling technician will remove the soil core from the sampler for field screening, description, and placement into sample jars. Soil samples will be transferred from the core into labeled, laboratory-supplied sample jars using a clean stainless steel spoon. Any extra soil generated during drilling activities will be managed as investigation derived waste (IDW).

The field technician will observe and document the push probe activities including preparing a detailed field log for the exploration. The field geologist will describe the soil samples, noting any indications of contamination, and will describe the lithologic characteristics using the Unified Soil Classification System (USCS). Other features such as sorting, sedimentary features, mineralogy, degree of weathering, and contacts with other soil types will also be noted if relevant.

All soil samples will be observed for field evidence (odor or sheen) of contamination. Organic vapor headspace measurements will be performed on all soil samples using a photoionization detector (PID) equipped with a 10.6 electron volt (eV) lamp.

4.2.2 Groundwater Sampling

Groundwater samples will be collected from the push probe explorations by advancing the probe to the desired depth and pulling the probe back to

expose a stainless steel screen. Groundwater will be allowed to flow into the screened section until sufficient water is available for sampling.

The push probes will be pushed to a depth of about 40 feet. This depth is about 10 feet below the top of the shallow water table and is anticipated to correspond to a zone of medium to fine sand. The medium to fine sand should provide sufficient volumes of water to collect the necessary sample volumes.

If groundwater flows into the bore hole at a sufficient rate, water will be purged from the hole prior to collecting the sample. Temperature, pH, and conductivity will be measured in the purged water The purging will continue until successive measurements of the field parameters are within 10 percent and the water is relatively non-turbid. Purged groundwater will be managed as IDW.

A groundwater sample will be obtained from the probe hole using a bailer. Care will be taken to minimize the turbidity of the sample. Samples for PAH and metals analysis will be collected prior to collecting samples for VOC analysis. Samples collected for filtered metals analysis will be filtered immediately after collection using a 0.45 micron filter.

The groundwater samples will be placed directly into laboratory-supplied containers. The containers will be placed directly into a chilled cooler for transport to the analytical laboratory. The samples will be collected and transported using proper chain-of-custody procedures.

4.3 Field QA/QC Procedures

One field duplicate surface soil sample will be collected to assess the representativeness of the surface soil field sampling technique. A trip blank will be prepared by the laboratory and included with the field-collected groundwater samples for the VOC analysis. The trip blank will be analyzed for VOCs to assess for possible background and cross-contamination incurred during handling and transport of the groundwater sample.

SECTION 5

ANALYTICAL LABORATORY ANALYSIS

This section presents the laboratory analysis methods that will be used to analyze the soil and groundwater samples collected. Laboratory analysis will be performed by North Creek Analytical laboratory in Beaverton, Oregon using EPA methods and QA/QC procedures.

5.1 Columbia Forge Yard Surface Soil Samples

Each surface soil sample collected to assess the Columbia Forge yard will be analyzed using the following methods:

- PAHs by EPA Method 8310 or 8270 SIM
- Total Priority Pollutant Metals by EPA 3000/6000/7000 series
- TCLP Priority Pollutant Metals by EPA Method 1311/6000/7000 series
- VOCs by EPA Method 8261

The TCLP analysis results will be used in the assessment of whether there are potential groundwater impacts.

5.2 Import Black Sand Soil Samples

Each soil sample collected to assess the black sand will be analyzed using the following methods:

- PAHs by EPA Method 8310 or 8270 SIM
- Total Lead by EPA Method 3000 series/6010
- TCLP Lead by EPA Method 1311/6010
- Total Mercury by EPA Method 7471
- TCLP Mercury by EPA Method 1311/7471
- Total Cadmium by EPA Method 3000 series/6010
- TCLP Cadmium by EPA Method 1311/6010
- Total Chromium by EPA Method 3000 series/6010
- TCLP Chromium by EPA Method 1311/6010
- PCBs by EPA Method 8082

The TCLP analysis results will be used in the assessment of whether there are potential groundwater impacts.

5.3 DEQ-Identified Potential Historical Sources Soil and Groundwater Samples

5.3.1 Soil Samples

One soil sample collected from each of the push probe explorations will be analyzed using the following methods:

- PAHs by EPA Method 8310 or 8270 SIM
- VOCs by EPA Method 8261

In addition, one soil sample collected from the push probe exploration downgradient (south) of the former 1924 foundry, machine shop, pattern shop, and coke storage area (PP-3) will be analyzed using the following methods:

- Total Priority Pollutant Metals by EPA 3000/6000/7000 series
- TCLP Priority Pollutant Metals by EPA Method 1311/6000/7000 series

The TCLP analysis results will be used in the assessment of whether there are potential groundwater impacts.

5.3.2 Groundwater Samples

Each groundwater sample collected from the push probe explorations will be analyzed using the following methods:

- PAHs by EPA Method 8310 or 8270 SIM
- VOCs by EPA Method 8261

In addition, the groundwater sample collected from the push probe exploration downgradient (south) of the former 1924 foundry, machine shop, pattern shop, and coke storage area (PP-3) will also be analyzed using the following methods:

- Total Priority Pollutant Metals by EPA 6000/7000 series

Both field-filtered and unfiltered groundwater samples will be analyzed using the metals analysis.

5.4 Abandoned Pipe Soil Samples

The surface soil samples collected from beneath the end of each of the two abandoned riverbank pipes will be analyzed using the following methods:

- PAHs by EPA Method 8310 or 8270 SIM
- Total Priority Pollutant Metals by EPA 3000 series/6000/7000 series
- TCLP Priority Pollutant Metals by EPA Method 1311/6000/7000 series
- VOCs by EPA Method 8261

5.5 Laboratory QA/QC Procedures

Standard analytical laboratory procedures will be used including method blanks, surrogate spikes, blank spikes, and blank spike duplicates. A QA/QC review of the laboratory data will be performed once the data is received from the analytical laboratory. This review will include the following:

- Chain-of-custody complete and correct
- Analysis within holding times
- Chemicals of interest in method blanks
- Blank spike recoveries within accuracy control limits
- Blank spike duplicate results within analytical precision control limits
- Surrogate recoveries within accuracy control limits
- Matrix spike recoveries within accuracy control limits
- Matrix spike duplicate results within analytical precision control limits
- Detection limits sufficiently low

On the basis of the results of the QA/QC data review, the data will be flagged according to standard EPA procedures. Questionable data will be flagged with a "J" and considered an estimated value. Data unacceptable for its intended use will be rejected and flagged with an "R."

SECTION 6

REPORTING

The results of the PA sampling will be presented in a report once the results of the chemical analysis are received from the laboratory. The report will include the following:

- Table showing the results of the chemical analysis.
- Figure showing the location of the soil samples and push robe explorations.
- Description of the soil and general site conditions in the area where the samples were collected.
- Field logs prepared during the push probe explorations.
- Discussion of any unanticipated or unusual conditions encountered while collecting the soil samples.
- Relevant photographs taken during the sampling activities.
- Copy of the analytical laboratory report.

The report will also include a brief assessment of the potential for releases and migration of hazardous substances based on the results of the PA sampling.

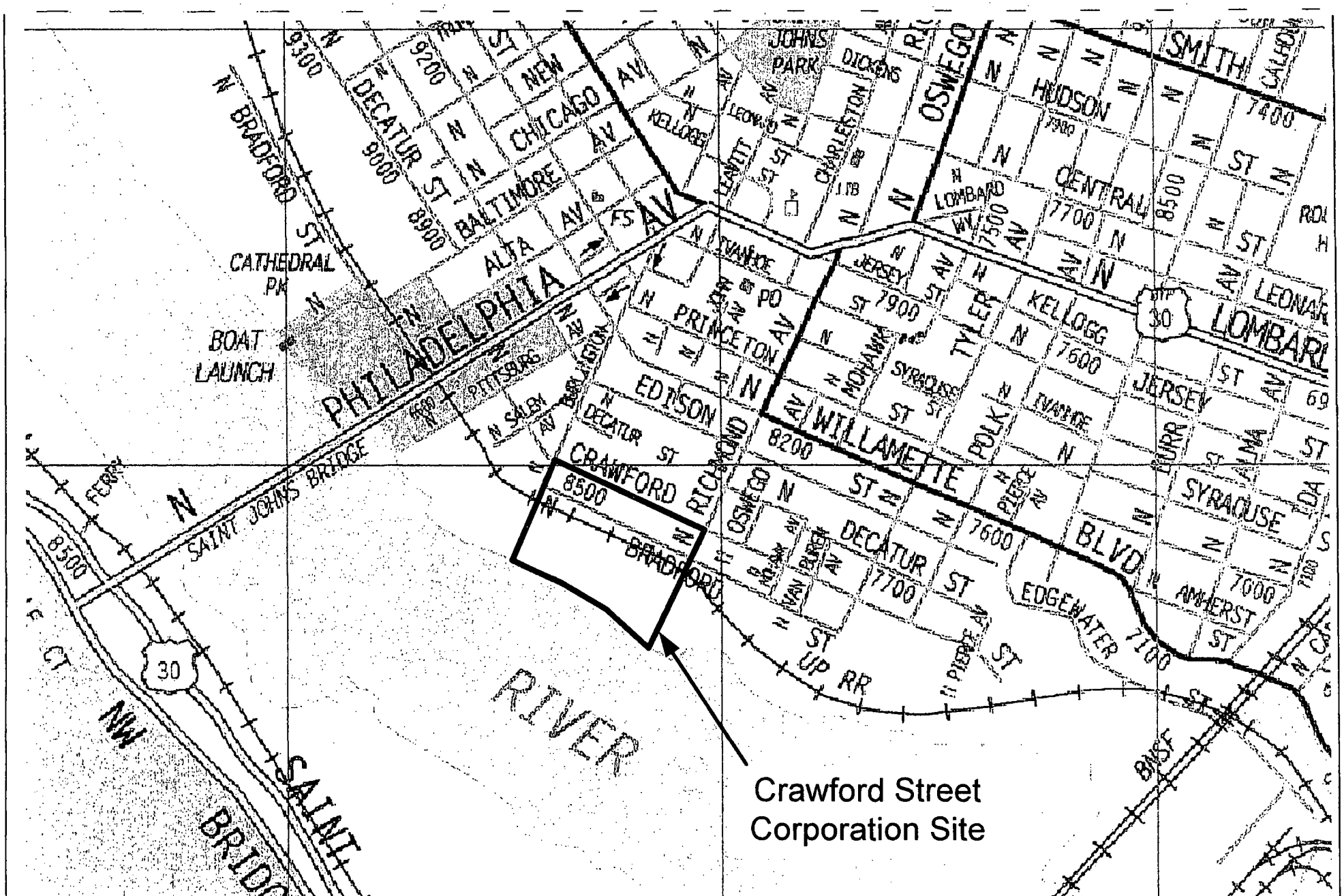

Figure 1-1
Site Location Map
Crawford Street Corporation Site

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UPRR Diesel Pipeline
N. Leavitt
N. John
N. Charleston
Storm Drain
Sanitary Sewer
N. Crawford
Catch Basin
Steel Plate Storage
N. Burlington
Lampros Steel
TLS Steel
Columbia Forge
Columbia Forge and Lampros Steel Storage Yard
Lampros Steel
Vacant Lot
N. Richmond
Residence Auto Repair
UPRR Diesel Pipeline
UPRR Railroad Spur
Lampros Steel Storage Yard
City of Portland BES Lab
Willamette Cove/Metro
Top of Bank
Chain-Link Fence
Willamette River
(Project North)
N
80 Feet
Approximate Scale
Storm Drain and Catch Basin
Sanitary Sewer

Figure 1-2
Site Plan
Crawford Street Corporation Site
BRIDGEWATER GROUP, INC.

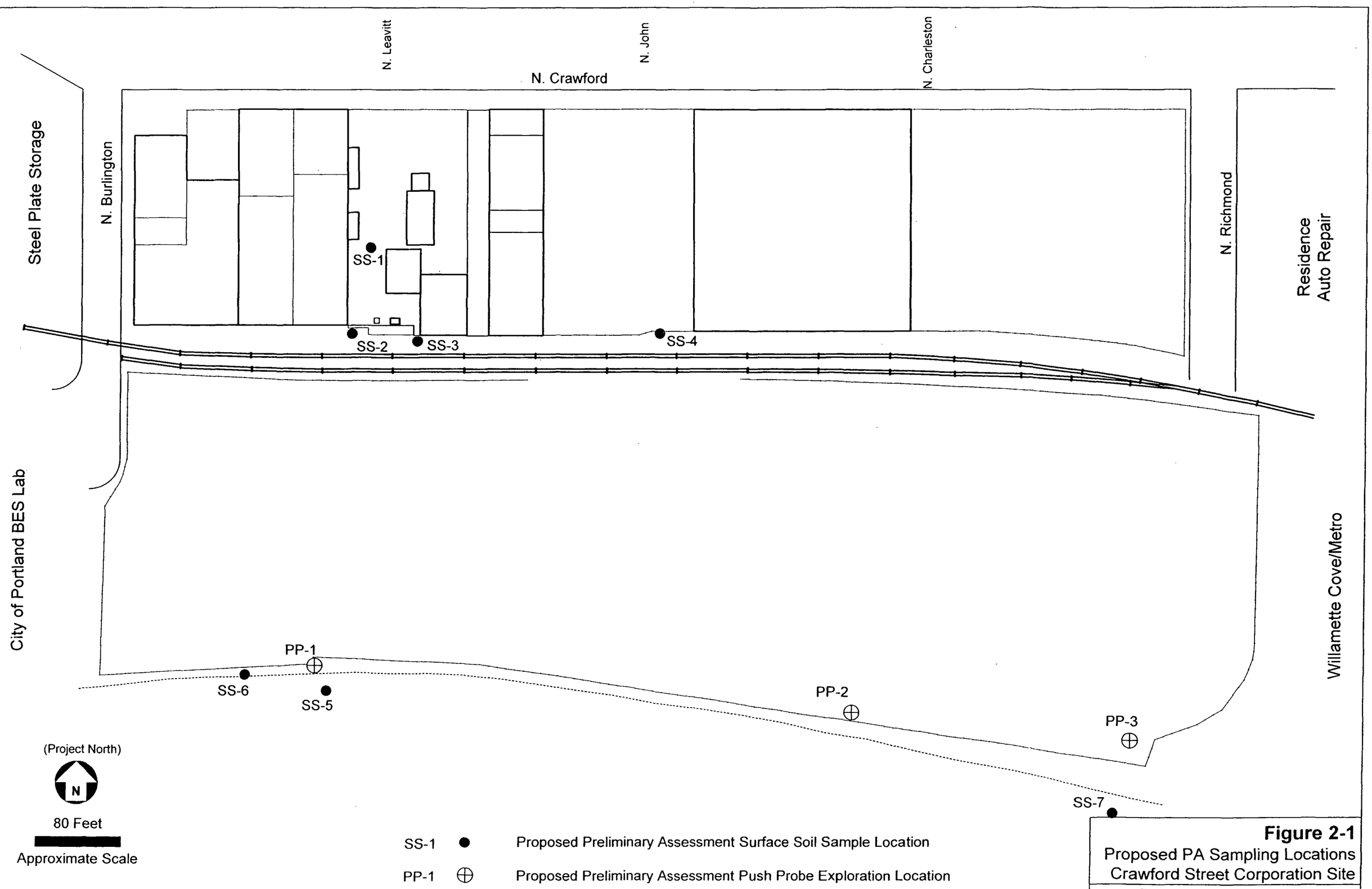

Figure 2-1
Proposed PA Sampling Locations
Crawford Street Corporation Site
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